Translation of KR 10-2003-0020386

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Application Number: KR10-2003-0020386

Date of Application: April. 01. 2003

Applicant(s): LG Electronics Inc.

COMMISIONER

[ABSTRACT OF DISCLOSURE]

[ABSRTACT]

The present invention relates to an optical disc write once and a method of managing defect information on the optical disc.

And more partially, the present invention records a spare area instead of a defect area on an optical disc write once. And the present invention records defect management information into a defect management information recording area which is created by separating a certain area of the optical disc medium. And the above defect management information is recorded per one cluster and the size is changed depending on a defect management information size. And the above defect management information includes a header, a defect area list and a pointer. And the header is recorded separating with DDS or in within DDS. Also, the above defect management information includes information expressing a number of a present usage cluster.

[TYPICAL DRAWINGS]

FIG 2

[INDEX WORD]

Optical recording medium, Optical disc, Blu-ray disc, BO-WO

[SPECIFICATION]

[TITLE OF THE INVENTION]

Defect management for Blu-ray disc writable once

[BRIF OF THE INVENTION]

FIG 1 illustrates a schematic view of a recording area structure of a single layer optical disc according to the present invention.

FIG 2 illustrates a schematic view of a recording area structure of a dual layer optical disc according to the present invention.

FIG 3 illustrates an embodiment of TDFL header structure according to the present invention.

FIG 4 illustrates a schematic view of a defect management method according to a first embodiment of the present invention.

FIG 5 illustrates a schematic view of TDFL pointer value change according to a first embodiment of the present invention.

FIG 6 illustrates a schematic view of a defect management method according to a second embodiment of the present invention.

FIG 7 illustrates a schematic view of a defect management method according to a third embodiment of the

present invention.

[DETAIL DESCRIPTION OF THE INVENTION]

[OBJECT OF THE INVENTION]

[FIELD OF THE INVENTION AND BACKGOUND OF THE RELATED ART]

The present invention relates to optical recording medium, and more particularly, to a defect management method for a write-once optical recording medium.

Optical discs are broadly used as a recording medium for recording a large amount of data. Among those, recently, a new high-density optical recording medium (HD-DVD,) such as a blue-ray disc is on development for recording and storing a video data of high picture quality and an audio data of high sound quality for a long period of time.

The blue-ray disc is HD-DVD technology and an optical recording solution for next generation and stores distinguishably larger amount of data than a conventional DVD.

In recent years, the global technology specification standard for the blue-ray disc is being created.

The blue-ray disc being a global standard of HD-DVD uses far more dense blue rays of 405 nm wave length than the conventional DVD using red rays of 650 nm wave length

and can store larger amount of data than the conventional DVD on a disc 1.2 mm of thickness having 0.1mm recording layer and 12 cm diameter.

Also, the blue-ray disc can store much more amount of data than the conventional DVD when a cross-section two-layers recording technology making two recording layers on one side of the disc with 0.85 NA (Lens Numerical Apertures) greatly influencing an increase of a storing capacity by closely irradiating rays passed through a lens to the optical disc.

The blue-ray disc is high numerical aperture lens and is dense with 0.32μm track pitch. An optical disc being manufactured by using the technology can transmit data at much faster speed than DVD Rom and CD Rom.

When formatting video and audio data, formatting method on conventional DVD such as MPEG 2(video), AC3, MPEG1 and layer 2(audio) can be used with compatibility.

When making a HD-DVD type drive effectively protecting data, data can be stored on and reproduced from most of conventional DVD discs being presently used.

Many kinds of standards related to the blue-ray disc is provided and related to a write-once blue-ray disc (BD-WO) followed by a rewritable blue-ray disc (BD-RE.).

A single layer blue-ray disc is divided into a lead-in zone, a data zone and a lead-out zone. A dual layer

blue-ray disc is divided into the lead-in zone, the data zone, the lead-out zone and an outer zone.

If a defect area is found during recording, the rewritable blue-ray disc moves data recorded in the defect area to an alternative prepared area so as to rerecord the data.

The location information related to the defect area and an alternative recording area is recorded as defect area management information.

Defect management is one of important things when recording data on the write-once blue-ray disc. Various researches and activities are in process of development for effective management of the defect zone and fast and exact recording on the write-once blue-ray disc.

An alternative recording area and a management area of defect management information are needed to manage the defect area on the write-once blue-ray disc.

Particularly, because of a characteristic of the rewritable blue-ray disc that it can rewrite data, the size of the defect management area can be small.

The write-once blue-ray disc writes only once and needs a bigger size of the defect management area compared to the rewritable blue-ray disc.

Also, the regulation of the defect management on the write-once blue-ray disc, includes not only a common point,

constancy and compatibility to meet standards of the rewritable blue-ray disc, but also a regulation for recording and reproducing management information more effective, stable and high efficiency.

[TECHNICAL SOLUTION OF THE INVNETION]

An object of the present invention is to provide a method of a defect management on a write-once optical recording medium such as a blue-ray disc.

Particularly, the present invention manages defect area management information after recording it into a temporary defect management area (TDMA).

And the above defect management information includes a header, a defect list, and a disc definition structure and is managed by one cluster.

The size is changeable interlocking with a recoding information volume.

Furthermore, the present invention is to provide to a method of a defect management on a write-once optical recording medium such as a blue-ray disc in order to effetely manage the defect area by forming header, entry DDS more efficient than before.

[DETAIL OF THE INVENTION]

To achieve the above object, the method for managing defect information management of an optical recording medium writeable once according to the present invention has a defect management area recorded a defect management information in order to manage a defect area of the optical recording medium writeable once.

And the above defect management information recorded into the above defect management area recorded containing defect area list, the above defect list information, and the location information of the latest defect management information.

Also, To achieve the above object, the another method for managing defect information management of an optical recording medium writeable once according to the present invention has a defect management area recorded a defect management information in order to manage a defect area of the optical recording medium writeable once.

And the above defect management information recorded into the above defect management area recorded containing a defect area list, a header recording the above defect area list information into each of the defect area lists, and disc definition information having the location information of the latest defect management.

Also, To achieve the above object, the another method for managing defect information management of an optical

recording medium writeable once according to the present invention has a defect management area recorded a defect management information in order to manage a defect area of the optical recording medium writeable once.

And the above defect management information recorded into the above defect management area recorded containing a defect area list, a header recording the above defect area list information, and disc definition information having the location information of the latest defect management.

Also, To achieve the above object, the another method for managing defect information management of an optical recording medium writeable once according to the present invention has a defect management area recorded a defect management information in order to manage a defect area of the optical recording medium writeable once.

And the above defect management information recorded into the above defect management area recorded the information from a previous defect area to the present defect area list cumulatively when the defect management information, the header recording the above defect area list information, and the disc definition information containing the location of the latest defect management information.

Also, To achieve the above object, the another method for managing defect information management of an optical

recording medium writeable once according to the present invention records the header recorded about defect area list information of the optical recording medium, the defect area list information recorded the defect area information of the optical recording medium, and the location of the latest defect management information.

Reference will now be made in detail to the method of managing defect information on an optical disc write once according to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

For convenience' sake, explanation will be made with respect to a BD-WO (Blu-ray Disc Write Once) as an example.

In addition, general terms widely used are selected in describing the present invention.

In specified cases, however, terms selected at the applicant's discretion are also used, but their meanings are described in detail in the corresponding parts of the description.

Thus, it should be understood that the present invention should be grasp with the meanings of the terms, not the terms themselves.

FIG 1 illustrates a schematic view of a recording area structure of a single layer optical disc according to the present invention.

Partially, the optical disc in FIG 1 shows the single layer structure which is divided a lead-in zone, a data zone, and lead-out zone. And the arrow in each of areas is examples of a data recording direction.

Lead-in area has a defect management area (TDMA) proposed from the present invention.

Here, TDMA means a Temporary defect area and used for dividing the related defect management area(DMA; DMA1, DMA2, DMA3, DMA4). And that location is not restricted as shown in FIG 1.

And data area contains an inner spare area (ISA0) and an outer spare area (OSA0).

If the defect area is created during recording data on a single layer optical disc writable once, the date recorded into the defect area is recorded into the interchange area the above is a method for recording the above defect management information into the defect management area (TDMA) included on a certain area on disc.

Here, the interchange area is used such as the spare area. The defect management information recorded in the above defect management area (TDMA) contains the defect area list (TDFL), a header for recording the defect area list content (TDFL header), and the disc definition structure (TDDS).

The present invention records and manages the defect management information by one cluster.

And in the case of the single layer disc, that size is interlocked and changed depending on the defect management information volume within one to four clusters.

FIG 2 shows the dual layer structure which is divided a lead-in zone, a data zone, and lead-out zone. And the arrow in each of areas is examples of a data recording direction.

Lead-in area has a defect management area (TDMA1, TDMA2) proposed on each of recording layers.

Here, the data area contains an inner spare area (ISA0, ISA1) and an outer spare area (OSA0, OSA1).

If the defect area is created during recording data on a dual layer optical disc writable once, the date recorded into the defect area is recorded into the interchange area the above is a method for recording the above defect management information into the defect management area (TDMA1, TDMA2) included on a certain area on disc.

Here, the interchange area is used such as the spare area. The defect management information recorded in the above defect management area (TDMA) contains the defect area list (TDFL), a header for recording the defect area

list content (TDFL header), and the disc definition structure (TDDS).

The present invention records and manages the defect management information by one cluster.

And in the case of the dual layer disc, that size is interlocked and changed depending on the defect management information volume within one to four clusters.

FIG 3 illustrates an embodiment of TDFL header structure according to the present invention.

Within TDFL header, it contains a TDFL up-count, a TDFL entry, a TDFL entry number.

If needed, the information expressing the present usage cluster number is recorded within the TDFL header.

FIG 4 illustrates a schematic view of a defect management method according to a first embodiment of the present invention.

According to the method of managing defect information according to the first embodiment of the present invention as shown in FIG. 4, the latest TDFL is repeatedly recorded cumulatively with the previous TDFL, and only one TDFL header and one TDFL pointer are used with respect to the TDFL of the cumulatively repeated 1~4 clusters (or 1~8 clusters).

The TDFL header and the TDFL are recorded and managed in the unit of 1 cluster. In the case of an SL disc, the

size of the TDFL is varied from 1 cluster to 4 clusters, and in the case of a DL disc, the size of the TDFL is varied up to 8 clusters.

And TDFL header is recorded and managed separating with TDDS. And the information including the above TDFL header follows depending on the structure of FIG 3. And TDFL header is one cluster unite and is recorded after creating together with TDFL every time.

At the first stage *stage1*, it is assumed that a TDFL header1 and a TDFL1 are recorded in 1 cluster. In the TDDS, information that indicates the position of the latest defect management information is recorded, and in FIG. 4, this is expressed as P1 that is the TDFL pointer as described above.

And the location of the least defect management information is called as a pointer. The position information indicated by this pointer is the first PSN, i.e., address, of the corresponding cluster.

In FIG. 4, it is understood that the pointer indicates the position of the TDFL header1.

Since the defect management information recording unit(1 cluster) can be changeable 1 to 4 cluster on the single layer disc, the 4 pointer is needed. While, since the defect management information recording unit (1

cluster) can be changeable 1 to 8 clusters on the single layer disc, the 8 pointer is needed.

In FIG 5 shows the respective stages change of the pointer value. And the useless TDFL pointer value can express "0" or "FF."

At the second stage *stage2* in FIG. 4A, TDFL21 and TDFL22 are further recorded during an update operation. The defect management information is recorded in a once-recordable state in the recording unit of 1 cluster on the disc, and in recording the defect management information at the second stage *stage2*, TDFL21 and TDFL22, which include TDFL1c that is identical to TDFL1, are cumulatively recorded along with the corresponding TDFL header2 and TDDS2. The second stage *stage2* refers to the recording method in the case that the list information of the defect management area exceeds 1 cluster, but is less than 2 clusters. That is, TDFL header2 + TDFL1c + TDFL21 = 1 cluster, the TDFL22 is recorded, occupying a partial area of the second successive cluster, and TDFL header2 contains the contents of the TDFL1c, TDFL21 and TDFL22 as a whole.

AT this time, the pointer value recorded in the TDDS2 shows that the latest defect information position P2 and P3 are recorded.

That is, since the defect management information is cumulatively recorded, only one latest PSN is sufficient for the pointer.

At the third stage *stage3*, TDFL31 and TDFL32 are further recorded during the update operation.

The defect management information is recorded in a once-recordable state in the recording unit of 1 cluster on the optical disc write once as described above, and in recording the defect management information at the third stage *stage3*, TDFL31 and TDFL32, which include TDFL22c that is identical to TDFL22, are recorded along with the corresponding TDFL header4 and TDFL header5 and TDDS3.

At this time, the TDFL header2, the corresponding TDFL1c and the TDFL21 are not newly recorded, but information that indicates the position P2 is recorded in the TDDS3, so that an unnecessary repeated recording is prevented, and the use efficiency of the recording area of the disc is heightened.

Also, if the TDFL22c, TDFL31 and TDFL32 information exceeds 1 cluster, but is less than 2 clusters, i.e., TDFL header4 + TDFL22c + TDFL31 = 1 cluster, the TDFL32 is recorded, occupying a partial area of the second successive cluster, along with the corresponding TDFL header5.

At this time, the pointer value recorded in the TDDS3 shows that the latest defect information positions P2, P4 and P5 are recorded.

The latest TDFL information can be obtained using P2, P4 and P5, which are positions of the latest defect management information recorded in the TDDS3.

That is, the TDFL header2, TDFL1c and TDFL21 information can be obtained using the P2 position information indicated by the first TDFL pointer, and the TDFL header4, TDFL22c and TDFL31 information can be obtained using the P4 position information indicated by the second TDFL pointer.

The TDFL header5 and TDFL32 information can be obtained using the P5 position information indicated by the third TDFL pointer.

At the fourth stage *stage4*, the defect management information after the sorting is performed is shown.

Here, the sorting means that the defect management information is sorted according to the PSN of the TDFL entry based on the TDFL entry type.

From a viewpoint of the third stage *stage3*, the sorting is performed under the assumption that a new TDFL entry to be included in the P2x position is produced.

Since all the information of TDFL1c, TDFL21, TDFL22c, TDFL31 and TDFL32 are changed through sorting by the P2x,

the changed TDFL information is recorded as the TDFL41, TDFL42 and TDFL42, and the corresponding TDFL header6, TDFL header7 and TDFL header 8 are recorded along with a new TDDS4.

Here, in the TDDS4, P6, P7 and P8, which are position information of the latest defect management information of the latest defect management information, are recorded. The TDFL header 6 and the TDFL41 occupy 1 cluster, the TDFL header 7 and the TDFL42 occupy 1 cluster, and the TDFL header8 and the TDFL43 occupy less than 1cluster.

Accordingly, at the fourth stage, the defect area management information exceeds 2 clusters, but is less than 3 clusters.

In summary, according to the method of managing defect information on an optical disc write once according to the first embodiment of the present invention, the TDFL header and the TDFL are recorded in the recording unit of 1 cluster whenever it is updated, and at this time, if the TDDS expresses the position of the latest defect management information, and the recording is performed in excess of 1 cluster, the repeated recording is minimized using the information that represents the position of the latest defect management information, and the latest defect

management information can be efficiently and promptly obtained.

Meanwhile, in FIG. 4, obtaining of the defect management information may be divided into a case that the corresponding header has the corresponding information with respect to the TDFK contents, and a case that the latest TDFL header has the whole TDFL information.

For example, at the second stage *stage2*, the former corresponds to the case that the TDFL header2 has only the information on the contents of the TDFL1c and TDFL21, and the TDFL header3 has only the information on the contents of the TDFL22. The latter corresponds to the case that the TDFL header5 has the information on the whole contents of the TDFL1c, TDFL21, TDFL22c, TDFL31, and TDFL32.

In the former case, all the information related to the corresponding defect area can be obtained by processing all entry information of all headers in the position indicated by the information that represents the position of the latest defect management information, and in the latter case, all the information related to the whole defect area can be obtained at a time only by the contents of the latest TDFL header.

Also, in FIG. 4, the TDFL header has the information that indicates the number of clusters currently used. This means that a flag for representing how many clusters are

used for representing the defect management area list can be employed since the size of the defect management information is variable. It is also possible to record the information for representing the number of clusters currently used in not only the TDFL header but also the TDDS.

FIG 6 illustrates a schematic view of a defect management method according to a second embodiment of the present invention.

And FIG 6 shows a defect management method according to a second embodiment of the present invention.

The defect management information (TDFL) recording unit(1 cluster) can be changeable 1 to 4 cluster on the single layer disc While, the defect management information recording unit (1 cluster) can be changeable 1 to 8 clusters on the single layer disc.

And the TDFL header contained in the TDDS is recorded and managed together with the TDDS.

At the first stage *stage1*, it is assumed that the TDFL header1 and the TDFL1 are recorded in 1 cluster. In the TDDS, information that indicates the position of the latest TDFL is recorded, and in FIG. 6, this is expressed as P1.

The position information indicated by this pointer is the first PSN, i.e., address, of the corresponding cluster

in the optical disc structure.

In FIG. 6, it is understood that the pointer indicates the position of the TDFL header1.

In the case of an SL disc, the recording unit (e.g., 1 cluster) of the defect management information may be varied from 1 cluster to 4 clusters, and thus 4 pointers are required. In the case of a DL disc, the recording unit of the defect management information may be varied up to 8 clusters, and thus 8 pointers are required.

And the useless TDFL pointer value can express "0" or "FF."

At the second stage *stage2* in FIG. 6A, TDFL21 and TDFL22 are further recorded during an update operation. The defect management information is recorded in a once-recordable state in the recording unit of 1 cluster on the optical disc write once, and in recording the defect management information at the second stage *stage2*, TDFL21 and TDFL22, which include TDFL1c that is identical to TDFL1, are recorded along with the corresponding TDFL header2 and TDFL header3 and TDDS2.

The second stage *stage2* refers to the recording method in the case that the list information of the defect management area exceeds 1 cluster, but is less than 2 clusters. That is, TDFL header2 + TDFL1c + TDFL21 = 1 cluster, the TDFL22 is recorded, occupying a partial area

of the second successive cluster, and the corresponding TDFL header3 is recorded. At this time, the pointer value recorded in the TDDS2 shows that the latest defect information positions P21 and P22 are recorded.

At the third stage *stage3*, the defect management information after a sorting is performed is shown.

Here, the sorting means that the defect management information is sorted according to the PSN of the TDFL entry based on the TDFL entry type.

From a viewpoint of the second stage *stage2*, the sorting is performed under the assumption that a new TDFL entry to be included in a P2x position is produced.

If a new TDFL entry to be recorded is produced and is to be managed, the new TDFL should be recorded by reflecting the list information of the defect area sorted according to the sorting rule as described above. The third stage *stage3* shows this.

That is, since all the information of TDFL1c, TDFL21 and TDFL22 are changed through sorting by the P2x, the changed defect management area list information is recorded as the TDFL31 and TDFL32, and the TDFL header3 corresponding to the TDFL31 and the TDFL32 is recorded in the lead of the corresponding information.

Also, in the TDDS3, the position information P3 of the latest defect management information is recorded. The

TDFL31 occupies 1 cluster, and the TDFL32 occupies less than 1 cluster, following the TDFL31.

Accordingly, at the third stage, the defect area management information exceeds 1 cluster, but is less than 2 clusters.

In summary, according to the method of managing defect information on an optical disc write once according to the second embodiment of the present invention, the TDFL is cumulatively recorded in the recording unit of 1 cluster whenever it is updated, and at this time, the TDDS expresses the position of the latest defect management information with one pointer only.

Also, in the case that the defect management information is changed according to the sorting rule, it can adaptively cope with such a change.

In FIG. 6, the TDFL header has the information that indicates the number of clusters currently used. This means that a flag for representing how many clusters are used for representing the defect management area list can be employed since the size of the defect management information is variable.

It is also possible to record the information for representing the number of clusters currently used in not only the TDFL header but also the TDDS.

FIG 7 illustrates a schematic view of a defect

management method according to a third embodiment of the present invention.

According to the method of managing defect information according to the first embodiment of the present invention as shown in FIG. 7, the latest TDFL is repeatedly recorded cumulatively with the previous TDFL, and only one TDFL header and TDDS are used with respect to the TDFL of the cumulatively repeated 1~4 clusters (or 1~8 clusters). The TDFL header and the TDFL are recorded and managed in the unit of 1 cluster.

In the case of an SL disc, the size of the TDFL is varied from 1 cluster to 4 clusters, and in the case of a DL disc, the size of the TDFL is varied up to 8 clusters. And TDFL header is recorded and managed separating with TDDS. And the information including the above TDFL header follows depending on the structure of FIG 3.

At the first stage *stage1*, it is assumed that a TDFL header1 and a TDFL1 are recorded in 1 cluster.

In the TDDS, information that indicates the position of the latest defect management information is recorded, and in FIG. 7, this is expressed as P1 that is the TDFL pointer as described above.

The position information indicated by this pointer is the first PSN, i.e., address, of the corresponding cluster.

In FIG. 7, it is understood that the pointer indicates the position of the TDFL header1.

At the second stage *stage2* in FIG. 7, TDFL21 and TDFL22 are further recorded during an update operation. The defect management information is recorded in a once-recordable state in the recording unit of 1 cluster on the disc, and in recording the defect management information at the second stage *stage2*, TDFL21 and TDFL22, which include TDFL1c that is identical to TDFL1, are cumulatively recorded along with the corresponding TDFL header2 and TDDS2. The second stage *stage2* refers to the recording method in the case that the list information of the defect management area exceeds 1 cluster, but is less than 2 clusters. That is, TDFL header2 + TDFL1c + TDFL21 = 1 cluster, the TDFL22 is recorded, occupying a partial area of the second successive cluster, and TDFL header2 contains the contents of the TDFL1c, TDFL21 and TDFL22 as a whole.

AT this time, the pointer value recorded in the TDDS2 shows that the latest defect information position P2 is recorded. That is, since the defect management information is cumulatively recorded, only one latest PSN is sufficient for the pointer.

At the third stage *stage3*, the defect management information after a sorting is performed is shown.

Here, the sorting means that the defect management information is sorted according to the PSN of the TDFL entry based on the TDFL entry type.

From a viewpoint of the second stage *stage2*, the sorting is performed under the assumption that a new TDFL entry to be included in a P2x position is produced.

If a new TDFL entry to be recorded is produced and is to be managed, the new TDFL should be recorded by reflecting the list information of the defect area sorted according to the sorting rule as described above. The third stage *stage3* shows this.

That is, since all the information of TDFL1c, TDFL21 and TDFL22 are changed through sorting by the P2x, the changed defect management area list information is recorded as the TDFL31 and TDFL32, and the TDFL header3 corresponding to the TDFL31 and the TDFL32 is recorded in the lead of the corresponding information.

Also, in the TDDS3, the position information P3 of the latest defect management information is recorded. The TDFL31 occupies 1 cluster, and the TDFL32 occupies less than 1 cluster, following the TDFL31.

Accordingly, at the third stage, the defect area management information exceeds 1 cluster, but is less than 2 clusters.

In summary, according to the method of managing defect information on an optical disc write once according to the third embodiment of the present invention, the TDFL is cumulatively recorded in the recording unit of 1 cluster whenever it is updated, and at this time, the TDDS expresses the position of the latest defect management information with one pointer only.

Also, in the case that the defect management information is changed according to the sorting rule, it can adaptively cope with such a change.

In FIG. 7, the TDFL header has the information that indicates the number of clusters currently used. This means that a flag for representing how many clusters are used for representing the defect management area list can be employed since the size of the defect management information is variable.

It is also possible to record the information for representing the number of clusters currently used in not only the TDFL header but also the TDDS.

[EFFECT OF THE INVENTION]

The present invention is to provide a method for managing a defect area when the defect area is created on an optical recording medium writeable once.

Also, the present invention records defect area as

interchange area on Blu-lay disc writable once. And furthermore, it is possible to write, record, check the defect management information on the Blu-lay disc writeable once by recording defect management information into the defect management area included on a certain area of disc.

Specially, the present invention records and manages the defect management information by one cluster unite, and the present invention makes the disc definition information point at the least defect management information position. For the reason, it is possible to prevent useless repeat recording and to use efficiently storing space. In Addition, it is possible to obtain the corresponding information and to maintain the above information.

What is claimed:

1. A method for managing defect information of an optical recording medium writable once includes:

Having a defect management area recording a defect information in order to manage an defect area of an optical recording medium writable once;

Defect management information recorded into the above defect management area which includes a defect area list, a header recording the above defect area list information into respective defect area lists ,and an information expressing the location of the least defect management information.

2. In claim 1, the method for managing defect information of an optical recording medium writable once wherein;

The above header,

The defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size.

3. In claim 1, the method for managing defect information of an optical recording medium writable once

wherein;

The above header

The defect area list information is recorded and managed by one cluster unit; and

The respective corresponding header has the above defect area lists information.

4. In claim 1, the method for managing defect information of an optical recording medium writable once wherein;

The above header

The defect area list information is recorded and managed by one cluster unit; and

The least header has the above defect area lists information.

5. In claim 1, the method for managing defect information of an optical recording medium writable once wherein The information expressing the above least defect management information position is recorded within the disc definition information.

6. In claim 1, the method for managing defect information of an optical recording medium writable once wherein;

The above header;

The defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size;

And the present usage cluster number is recorded.

7. In claim 1, the method for managing defect information of an optical recording medium writable once wherein The above header and the defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size.

8. A method for managing defect information of an optical recording medium writable once includes:

Having defect management area recording defect information in order to manage a defect area of an optical recording medium writable once;

Defect management information recorded into the above defect management area which includes a defect area list,

A header recording the above defect area list information into respective defect area lists, and

Information expressing the location of the least defect management information.

9. In claim 8, the method for managing defect information of an optical recording medium writable once wherein;

The above header;

The defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size.

10. In claim 8, the method for managing defect information of an optical recording medium writable once wherein;

The above header and the defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size; and

The present usage cluster number is recorded.

11. In claim 1, the method for managing defect information of an optical recording medium writable once wherein

The above header;

The defect area list information is recorded and managed by one cluster unit and that recording size is

changed interlocking with a defect management information size.

The present usage cluster number is recorded within the above header.

12. In claim 1, the method for managing defect information of an optical recording medium writable once includes;

Having defect management area recording defect information in order to manage a defect area of an optical recording medium writable once;

The defect management information recorded in the above defect management area which records the previous defect area to the present defect area list cumulatively if the defect management information is recorded;

Header recording the above defect area list information; and

Disc definition information containing the location of the latest defect management information.

13. In claim 12, the method for managing defect information of an optical recording medium writable once wherein;

The above header;

The defect area list information is recorded and

managed by one cluster unit and that recording size is changed interlocking with a defect management information size.

14. In claim 12, the method for managing defect information of an optical recording medium writable once wherein;

The above header and the defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size; And

The present usage cluster number is recorded.

15. In claim 12, the method for managing defect information of an optical recording medium writable once wherein;

The above header and the defect area list information is recorded and managed by one cluster unit and that recording size is changed interlocking with a defect management information size; and

The present usage cluster number is recorded within the above header.

16. An optical recording medium writable once contains;

Header recording defect area list information of the optical recording medium;

Defect area list information recorded defect area information of the optical recording medium; and

Having Defect management area recording the least defect management information position.

17. In claim 16, an optical recording medium writable once wherein;

The above header;

The defect area list information is recorded and managed by one cluster unit and that recording size is changeable, and the header corresponding with respective defect area list information recorded; and

The above least defect management information position is recorded within the disc definition information.

18. In claim 16, an optical recording medium writable once wherein;

The above header

The defect area list information is recorded and managed by one cluster unit and that recording size is changeable, and the header corresponding with respective defect area list information recorded; and

The above least defect management information

position is recorded within the disc definition information.

19. In claim 16, an optical recording medium writable once wherein;

The above header and the defect area list information is recorded and managed by one cluster unit;

It is recorded cumulatively the previous list information to the least list information; and

The above least defect management information position is recorded within the disc definition.

FIG. 1

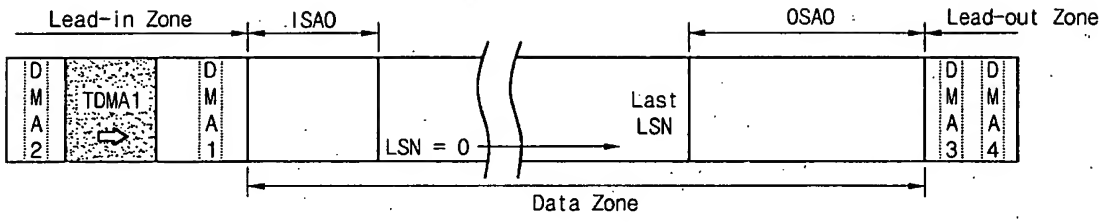


FIG. 2

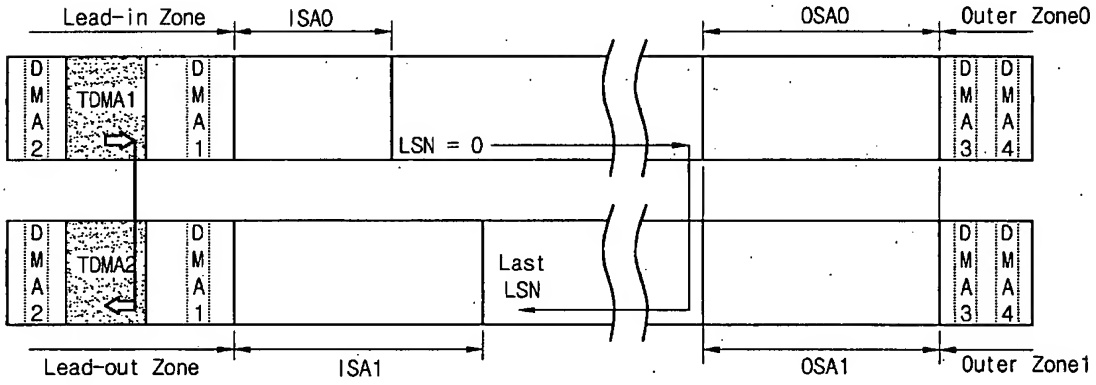


FIG. 3

Contents	Number of bytes
⋮	
TDFL Update Count	4
Number of entry type	N
Number of TDFL entries	4
⋮	

FIG. 4

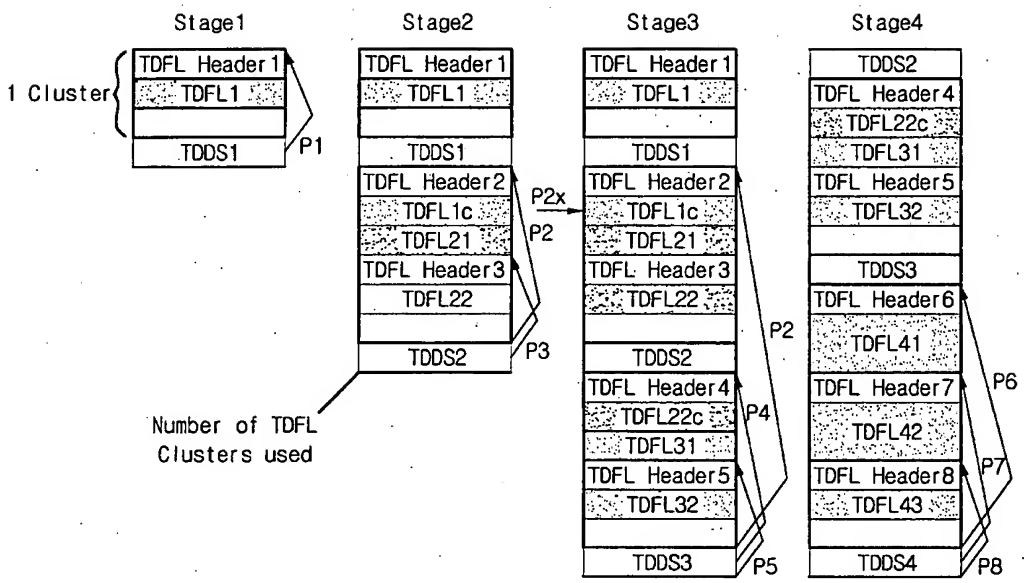


FIG. 5

Disc	TDFL Pointer	Stage1	Stage2	Stage3	Stage4	
SL disc (DC disc)	1st TDFL Pointer	P1	P2	P2	P6	···
	2nd TDFL Pointer	0	P3	P4	P7	···
	3rd TDFL Pointer	0	0	P5	P8	···
	4th TDFL Pointer	0	0	0	0	···
DL disc	5th TDFL Pointer	0	0	0	0	···
	6th TDFL Pointer	0	0	0	0	···
	7th TDFL Pointer	0	0	0	0	···
	8th TDFL Pointer	0	0	0	0	···

FIG. 6

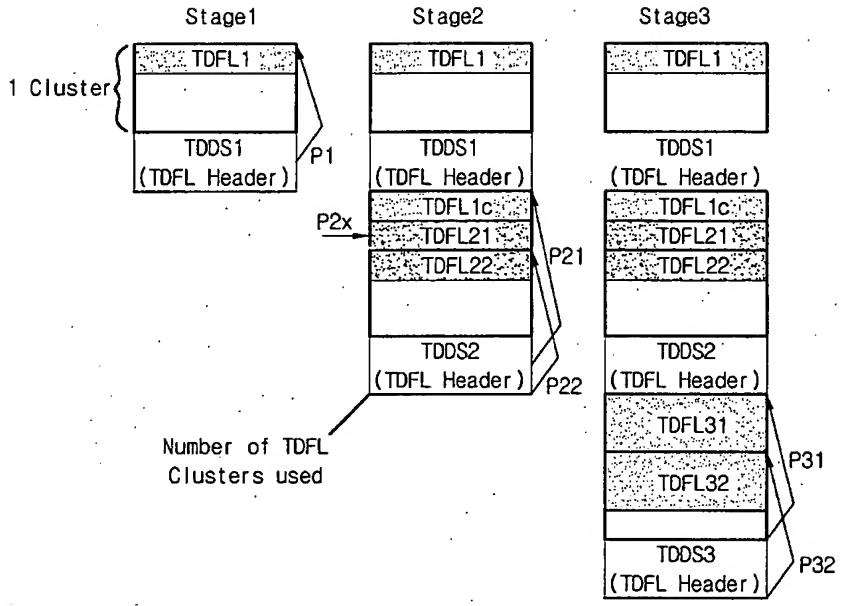
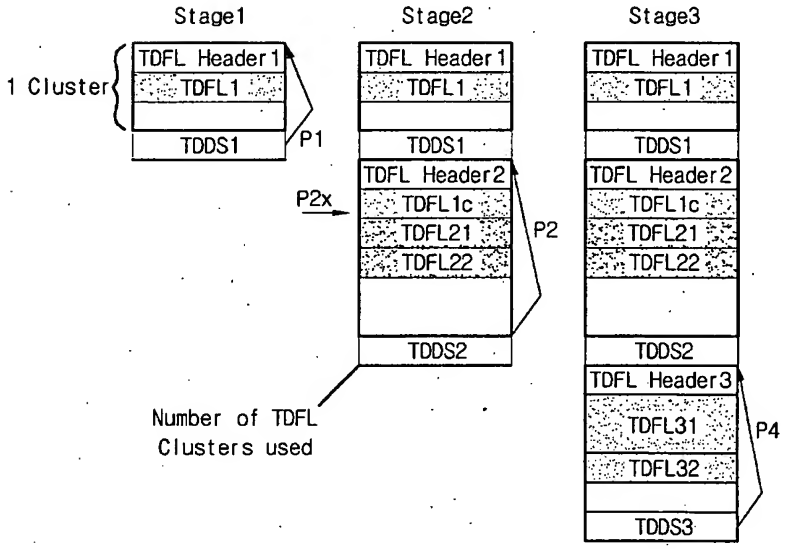

Stage1
Stage2
Stage3
1 Cluster
TDFL1
TDDS1
(TDFL Header)
P1
TDFL1c
TDFL21
TDFL22
P2x
P21
TDDS2
(TDFL Header)
P22
Number of TDFL
Clusters used
TDFL31
TDFL32
P31
TDDS3
(TDFL Header)
P32

FIG. 7


Stage1
Stage2
Stage3
1 Cluster
TDFL Header1
TDFL1
TDDS1
P1
P2x
TDFL1c
TDFL21
TDFL22
P2
TDDS2
Number of TDFL
Clusters used
TDFL Header2
TDFL Header3
TDFL31
TDFL32
P4
TDDS3